Papers on Anthropology XXVI/2, 2017, pp. 88–94

ANALYSIS OF CADETS' ANTHROPOMETRIC CHARACTERISTICS

Liana Pļaviņa, Silvija Umbraško

Institute of Anatomy and Anthropology, Department of Morphology, Riga Stradiņš University, Riga, Latvia

ABSTRACT

Anthropometric data reflect the quality of life, high working capacities and potentiality of individual creative abilities. The physical working and physical fitness capacities depend on physical health, physical development level, physical activity and healthy lifestyle. The aim of the paper is to evaluate the principal anthropometric characteristics, levels of physical activity and sports tests results in a group of cadets. We assessed the principal anthropometric characteristics (height, body mass) as well the anthropometric indices (body mass index) of cadets of the National Defence Academy in their 1st year of study and in the same group of cadets after three years, in their 4th year of study. We provided a questionnaire for the cadets in the study group concerning their physical activity and analysed the data of the standardized Nordic Questionnaire about Musculoskeletal Symptoms. The average values of the main anthropometric characteristics of the respondents in the 1st year of study were the following: height – 180.4±1.3 cm and body mass – 79.5±1.7 kg. After three years, we fixed the changes of body mass in the examined group: in 53% of cadets, the body mass had increased by more than two kg, but in 47% of respondents, body mass had remained at the same level. The average data in the study group of the 4th year students were: height 181.2±1.3 cm and body mass – 81.3±2.5 kg. Physical fitness is an indispensable part in the daily routine of each cadet. Physical fitness characterizes an individual's cardiorespiratory status, muscular strength and endurance as well as velocity and coordination. The fitness level of a person determines the results of the annual sports tests (sit-ups, push-ups and cross-country race). The results were stable for 68% of respondents. We also included the questions related to musculoskeletal symptoms (pain). Musculoskeletal pain symptoms have an impact on each individual's physical fitness level. The physical activity levels in the respondents'

https://doi.org/10.12697/poa.2017.26.2.09

group were high. They were closely associated with physical fitness, 76% of the respondents showed high results in annual physical fitness tests.

Keywords: *anthropometric characteristics of students; physical activity of students; harmful habits; physical development of students*

INTRODUCTION

Physical fitness characterizes an individual's cardiorespiratory status, muscular strength and endurance as well as velocity and coordination that comprise characteristic morphological and functional properties and provide an individual physical activity level [1, 2, 6, 9]. Physical activity is closely associated with physical fitness and is an indispensable part of the daily routine of the military personnel [4, 5, 7]. The fitness level of the military personnel determines the quality of performance of official duties [3, 8, 10, 11]; therefore, the military personnel annually pass three kinds of sports tests (3000 m cross-country race, push-up tests and sit-up tests). The ability to perform these sports tests depends on the individual's physical fitness level, muscular strength capacity and physical endurance [12, 13, 14].

The aim our study was to determine the changes of the main anthropometric characteristics in a cadets' group of the National Defence academy in their first and fourth years of study.

MATERIAL AND METHODS

We have assessed the principal anthropometric characteristics (height, body mass) as well the anthropometric indices (body mass index) of a cadets' group (n=21) of the National Defence Academy in their 1st and 4th years of study. We provided a questionnaire for the cadets concerning their physical activity [15]. We analysed the data of the standardized Nordic Questionnaire about Musculoskeletal Symptoms [8] in the study group.

RESULTS AND DISCUSSION

We determined the main anthropometric characteristics of the subjects in their 1st year of study. The average height was 180.4±1.3 cm and body mass – 79.5±1.7 kg. The body mass value of the examined group of 1st year cadets

varied from 70kg to 100kg. The body mass 42.8% of subjects was in the interval from 66kg to 75 kg; 38.1% of cadets in the examined group had a body mass value in the interval of 76–85 kg, and 19.1% of subjects had a body mass value above 86 kg (Fig. 1).

The average values of height after three years, in the subjects' 4th year of study, were 181.2±1.3 cm and body mass – 81.3±2.5 kg. The proportion of subjects whose body mass was between 66 kg and 75 kg slightly increased to 47.6%, the number of cadets whose body mass was in the interval of 76–85 kg decreased to 23.8%, but the number of respondents whose body mass was above 86 kg increased to 28.6%. The body mass of 52.4% of cadets increased by more than two kg in the period from 2013 till 2016, but in 9.5% of cadets the body mass values were stable. The body mass values decreased in 38.1% of the subjects. The body height of cadets in the 4th year varied from 173 cm to 192 cm. The body height of 61.9% cadets was in the interval between 171 cm and 180 cm, the body height of 3.3% of cadets was in the interval between 181 cm and 190 cm, and 4.7% of cadets had a body height value above 191 cm.

We subdivided the body mass index values (BMI) of the examined 1st year cadets' group into three intervals: the standard level of BMI from 20.0 to 25.0; 10% overweight when the BMI level was from 25.0 to 28.0; 20% overweight when BMI level was from 28.0 to 30.0 (Fig. 2). 61.9% of subjects in the 1st year cadets' group had the BMI value at the standard level that corresponds to the

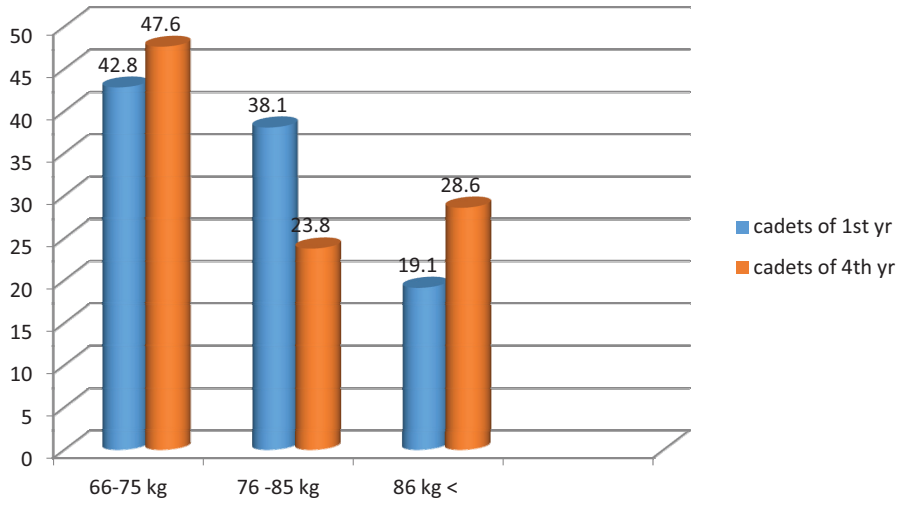

Figure 1. Distribution of cadets (%) according to body mass values.

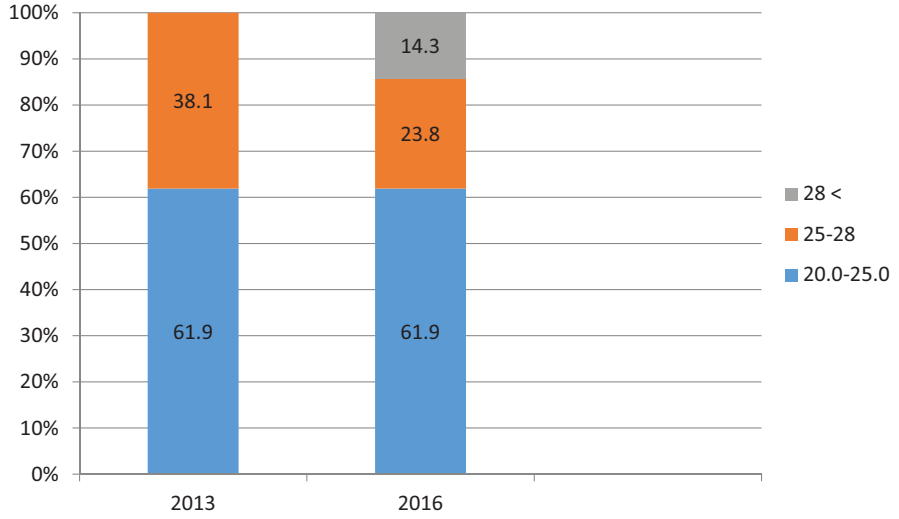

Figure 2. Distribution of cadets (%) according to body mass index values.

interval 20.0–25.00. The assessment the BMI of the rest the examined 1st year cadets' group revealed that 38.1% of cadets were 10% overweight.

The assessment of BMI after three years showed that the proportion of 4th year cadets with the standard level of BMI was stable (61.9%), but the proportion of 4th year cadets with 10% of overweight was 23.8%, and the proportion of 4th year cadets with 20% overweight comprised 14.3%.

The cadets' physical fitness was evaluated according to the results of annual physical tests. Physical training and testing of physical fitness and preparedness is a compulsory part of the study program. Assessment the complex of standard physical tests (push-ups, sit-ups and country cross-race – 3000 m for males) was performed by the sport instructors. The results were equated to points with differential approach according to the age of the individual (in age subgroups). 76.2% of cadets of the 1st year group showed results with distinction in the physical fitness tests. The proportion of individuals who got low and moderate assessment in physical fitness tests in the 1st year subjects of the examined group was 4.7%. After three years, the proportion of 4th year cadets who had results with distinction in the physical fitness tests comprised 60%; the proportion of cadets who had moderate and low assessment of physical fitness tests results had arisen to 20% (Fig. 3). We evaluated physical tests results individually – the sports results of 62.5% of cadets in the examined group were stable, but the results of 31.5 % of subjects had decreased.

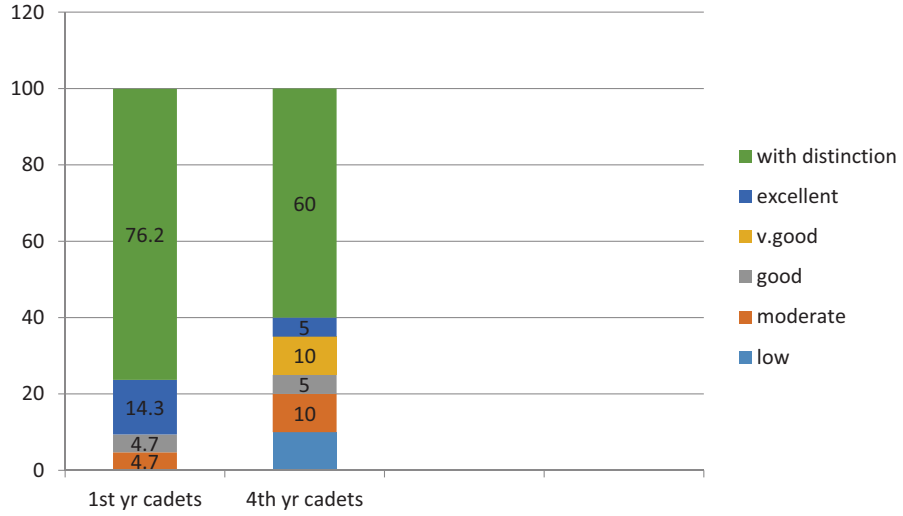

Figure 3. Distribution of cadets (%) into groups according to standard physical fitness tests results.

We administered the standardized Nordic questionnaire for the analysis musculoskeletal symptoms [8]. According to our results, the main problematic regions indicated by the cadets in the fourth year were: the lower back (52%); the knee region (28%); the neck region (32%), the hip region (20%) and the foot region (16%). Some cadets had combined musculoskeletal disorders (pain symptoms).

CONCLUSIONS

1. The changes in the average body mass in the group of subjects over three years (2013–2016) were small – from 79.5±1.7 kg to 81.3±2.5 kg. The proportion of cadets who had a body mass in the interval from 76 kg to 85 kg decreased by 14.3 percentage points, but the proportion of cadets whose body mass was above 86 kg increased by 9.5 percentage points and the proportion of cadets whose body mass was in the interval between 66 kg and 75 kg went up by 5 percentage points.
2. The individual body mass value increased by more than two kg in 52.4% of cadets in the period from 2013 to 2016. The body mass values were stable in 9.5% of the cadets, and the body mass value decreased in 38.1% of the subjects. The share of cadets with body mass index values that indicated 20% of overweight rose to 14.3% during the three-year period.

3. The cadets' physical fitness was at a high level. Individual evaluation of physical tests results revealed that sports results were stable in 62.5% of cadets but in 31.5% of subjects sports tests results decreased.
4. Analysis of musculoskeletal symptoms revealed that the most problematic regions for musculoskeletal pain in the examined group were the lower back and the upper back, followed by the neck region and the foot. During three years, the proportion of respondents with pain symptoms in the lower back region increased by 28 percentage points; in the hip region – by 7.5 percentage points, and the proportion of cadets with pain symptoms in the knee region decreased by 17.2 percentage points and in the foot region by 8.1 percentage points.

REFERENCES

1. Aandstad A., Hageberg R., Holme I.M., Anderssen S.A. (2014). Anthropometrics, body composition, and aerobic fitness in Norwegian home guard personnel. J Strength Cond Res, 28, 11, 3206–14. https://doi.org/10.1519/JSC.0000000000000524
2. Berry D.B., Rodriguez-Soto A.E., Gombatto S.P., Shahidi B., Palombo L., Chung C., Jensen A., Kelly K.R., Ward S.R. (2017). Lumbar spine posture in Marines during simulated operational positions. J Orthop Res, 2017, Jan. 4. https://doi.org/10.1002/jor.23510
3. Feuerstein M., Berkowitz S., Peck C.A. Jr (1997). Musculoskeletal-Related Disability in US Army Personnel: Prevalence, Gender, and Military Occupational Specialties. Med J of Occupational &Environmental Medicine, 39, 1, 68–78. https://doi.org/10.1097/00043764-199701000-00013
4. Friedl K.E., Westphal K.A., Marchitelli L.J., Patton J.F., Chumlea W.C., Gupo S.S. (2001). Evaluation of anthropometric equations to assess body composition changes in young women. Am J Clin Nutr, 73, 268–75.
5. Friedl K.E. (2012). Body Composition and Military Performance – Many Things to Many People. Journal of Strength & Conditioning Research, 26 (Supplement 2), 87–100. https://doi.org/10.1519/JSC.0b013e31825ced6c
6. Gallagher D., Heymsfield S.B., Heo M., Jebb S.A., Murgatroyd P.R., Sakamoto Y. (2000). Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. Am J Clin Nutr, 72, 3, 694–701.
7. Heir T., Eide G. (1996). Age, body composition, aerobic fitness and health condition as risk factors for musculoskeletal injuries in conscripts. Scand. J Med Sci Sports, 6, 4, 222–227. https://doi.org/10.1111/j.1600-0838.1996.tb00095.x
8. Kuorinka I., Jonsson B., Kilbom A., Vinterberg H., Biering-Sørensen F., Andersson G., Jørgensen K. (1987). Standardised Nordic questionnaires for the analysis

of musculoskeletal symptoms. Applied Ergonomics, 18, 3, 233–237. https://doi.org/10.1016/0003-6870(87)90010-X
9. Lystrup R., Gordon F., Ward M., Hall J., Stephens M. (2015). Exploring the Impact of a Pedometer on Body Composition and Physical Fitness in a Cohort of U.S. Military Medical Students: A Pilot Study. Military Medicine, 180, 1–23. https://doi.org/10.7205/MILMED-D-14-00132
10. McLaughlin R., Wittert G. (2009). The obesity epidemic: implications for recruitment and retention of defence force personnel. Obesity Reviews, 10, 6, 693–699. https://doi.org/10.1111/j.1467-789X.2009.00601.x
11. Mikkola I., Keinänen-Kiukaanniemi S., Jokelainen J., Peitso A., Härkönen P., Timonen M., Ikäheimo T. (2012). Aerobic performance and body composition changes during military service. Scandinavian Journal of Primary Health Care, 30, 95–100. https://doi.org/10.3109/02813432.2012.649631
12. Nogueira E.C., Guilherme G., Porto L., Rozenkranz N.M., Wagner M.R., Romulo F.M., Lunardi C.C., de Oliveira R.J. (2016). Body composition is strongly associated with cardiorespiratory fitness in a large Brazilian military firefighter cohort: the Brazilian firefighters study. Journal of Strength & Conditioning Research, 30, 1, 33–38. https://doi.org/10.1519/JSC.0000000000001039
13. Parkkari J., Taanila H., Suni J., Mattila V.M., Ohrankämmen O., Vuorinen P., Kannus P., Pihlajamäki H. (2011). Neuromuscular training with injury prevention counselling to decrease the risk of acute musculoskeletal injury in young men during military service: A population-based randomised study. BMC Medicine, 9, 35. https://doi.org/10.1186/1741-7015-9-35
14. Singh R., Prakash M., Dubey R., Roy K., Kotwal A., Mahen A. (2013). Body composition parameters as correlates of coronary artery disease. Indian J Med Res, 138, 6, 1016–9.
15. Vilenskij M.Ya., Il'inskij V.I. (1987). Fizicheskaya kul'tura rabotnikov umstvennogo truda. Moskva: Znanie.

Address for correspondence:
Liana Pļaviņa
Riga Stradiņš University
Institute of Anatomy and Anthropology, Department of Morphology
Kronvalda bulv. 9
Riga LV-1010, Latvia
Phone +371 29208611
E-mail: lianap@inbox.lv